Journal of the Society of Arts.

FRIDAY, NOVEMBER 2, 1866.

Announcements by the Council.

Examinations, 1867.

The Programme of Examinations for 1867 is now published, and may be had *gratis* on application to the Secretary of the Society of Arts.

In addition to the prizes offered by the Society of Arts, the Worshipful Company of Coach and Coach Harness Makers offer a prize of £3 in Freehand Drawing, and a prize of £2 in Practical Mechanics, to the candidates who, *being employed in the coach-making trade*, obtain the highest number of marks, with a certificate, in those subjects respectively.

Institutions.

The following Institutions have been received into Union since the last announcement:—

Belfast, Rosemary-street Science School.
Kendal, Christian and Literary Institute.
Lancaster, Mechanics' Institution.

Proceedings of Institutions.

Ipswich Working Men's College.—The annual meeting of the members of this College was held on Tuesday evening, the 25th September, when the certificates awarded at the Society of Arts examination in April last were distributed to the successful candidates. The chair was taken by the President of the Institution, the Lord Chief Baron of the Exchequer, Sir Fitzroy Kelly. The Lord Chief Baron said his appointment to the office he now held seemed to be no good reason why his connection with this Institution should cease, for unquestionably it had in no wise lessened the feelings of deep interest with which he had always considered and desired the well-being and prosperity of the Working Men's College. He was very happy to find that during the interval which had elapsed since the last meeting they had gone on and prospered. Without in any degree undervaluing the importance to the working man of securing to himself some relaxation, after the hard work and anxieties of the day, yet this fell far short in importance of the obtaining for the great body of the working-classes of this country a sufficient degree of education to fit them for the condition which it was their destiny to occupy in society. After delivering an interesting address on the value of education, the President called on the Principal of the College (Dr. E. Christian), who read the report of the Council. The accounts (which had been audited by Mr. George Christopherson) showed that the sum received was £176 2s., and the expenditure amounted to £167 4s. 10d., showing a balance in hand of £2 17s. 2d. There was a striking increase from the revenue of members' subscriptions, chiefly owing to the large addition which had been made on the register. The number of members last year was 653, and this year the number on the books was 1,003. The usual classes had been satisfactorily carried on, and also classes for chemistry (under Dr. W. Elliston), and for animal physiology, in relation to health (under Mr. H. G. Moore). In addition to the prizes and certificates awarded by the Society of Arts, local certificates had been granted for elementary qualifications. The Friday evenings during the session were devoted to lectures, readings, recitations, and music. The thanks of the College were due to various gentlemen for readings and recitations, and to others for musical services. Amongst the gentlemen mentioned as having presented the College with books was Mr. J. A. Ransome, who presented the "Encyclopedia Britannica," in 42 vols. A cricket club had been formed; steps had been taken for opening a gymnasium; many pleasant social gatherings of the members and friends had taken place; an open air concert had been held in the Lower Arboretum in July, attended by about 2,000 persons; and in August between 300 and 400 of their friends enjoyed an excursion to Lowestoft. In conclusion, the report congratulated all interested in promoting the welfare of the working-classes, on the great prosperity of the Institution. Regret was expressed at the loss of two of the vice-presidents, Mr. Richard Garrett, and Mr. Jeremiah Head, and the Council most particularly thanked "the President of the College for the interest he has evinced in its progress, not merely by lending his name, but by aiding its efforts on every occasion, and countenancing it by his presence when required, for the willingness with which he has continued to be connected with the College after his elevation to a high and important post, and for the readiness with which he accepted the invitation to take the chair at the meeting this evening."—Mr. S. H. Cowell moved the adoption of the report, and expressed his pleasure in finding that the Lord Chief Baron had consented to continue President of the College, and to take the chair on the present occasion. This was seconded by Mr. R. C. Ransome, and carried unanimously.—The President then distributed the prizes and certificates to the successful candidates. The meeting was then addressed by Mr. G. G. Sampson, Mr. Henry Footman, Dr. Christian, Mr. J. A. Ransome, and Mr. R. Pearce, and concluded with a cordial vote of thanks to the president.

Yorkshire Union of Mechanics' Institutions.—*Hebden Bridge Mechanics' Institution.*—The annual *soirée* was held on Oct. 20, in the mill of Messrs. Crossley, kindly lent for the occasion, Henry W. Horsfall, Esq., president, in the chair. The report stated that the good effect of the examinations held under the direction of the West Riding Educational Board were beginning to be manifest. The well-selected library had been well used, and the Institution was generally in a very prosperous condition. Mr. Henry H. Sales, Rev. J. Nelson, and others, addressed the meeting. During the evening the prizes and certificates awarded to the members by the West Riding Board were distributed. *Northowram Mechanics' Institution.*—On Monday, October 22nd, the members and friends celebrated their fifteenth anniversary, under the presidency of Mark Dawson, Esq. Notwithstanding the high price of admission the attendance was good. Addresses were given by Messrs. Sales, Bolton, and Blakey. *Otley Mechanics' Institution.*—Major Fawkes presided at the annual *soirée* of this Institution on Tuesday, October 23, supported by the principal residents in the parish. The erection of a building for the Institute was strongly advocated by the vicar, and large promises of support were given by subsequent speakers. Previous to the distribution of the prizes an address on the Society of Arts Scheme of Examination was given by Mr. Henry H. Sales. *Longpreston Mechanics' Institution.*—The usual annual *soirée* was held in the hall of the Institution on Wednesday, October 23. The Rev. J. E. Coulson, vicar of the parish, occupied the chair. After tea there was a display of fireworks on the village green. The public meeting was held in the Institute, which was tastefully decorated with flags, banners, and evergreens, and lighted

with Chinese lanterns. Short addresses were given by the Chairman, Mr. Henry H. Sales, and the parochial clergy. The meeting over, the annual Institution ball commenced, and dancing continued for some hours. Although there are no classes in connection with this Institution, the benefits it has conferred upon the village by its reading-room, library, and social gatherings, are borne witness to by all the residents. The village ball, five years since, was a scene of dissipation —now the utmost decorum prevails, and the vicar states that "the behaviour of all present is not surpassed by the frequenters of state entertainments."

GOVERNMENT AID TO SCIENCE AND ART EDUCATION.

The following is the substance of a paper by Mr. W. H. J. Traice, of Pendleton, read at the Annual Conference of Science Teachers and Science Secretaries, with the Council of the Union of Lancashire and Cheshire Institutes, on the 11th of August last:—

Government aid has been for many years applied to promote instruction in practical art, and more recently to diffuse a knowledge of various branches of science. The objects of this paper are to direct attention to the principle upon which grants for these purposes may be made consistently with sound national policy, and to suggest some expansions and modifications of the scheme, designed to render it more equitable as well as more efficient.

The aid to art instruction has till recently comprised the training of teachers, the grant of certificates, and payment of such teachers an annual sum on each certificate, with other payments to the teachers or gifts to the art school, contingent on results and other evidences of the fulfilment of required conditions. Then encouragement has been given to pupils by certificates of merit, prizes, medals, and free studentships. In respect to science, with which on this occasion we are chiefly concerned, no instruction has been directly imparted, but teachers have been invited to submit their attainments to the test of examination, a distinct certificate being given of competence to teach any of the subjects on the official list of the Department of Science and Art. Then an annual examination of pupils being held, the teachers who have conducted the classes (provided they hold certificates in the respective subjects taught) are entitled to claim payment on the results, such payments being proportioned to the proficiency exhibited by the pupils. Those attending the classes are also encouraged by prizes.

It will thus be seen that at present payments on results are exclusively made to a certificated teacher, and then only for results produced in the particular subject for which he holds a science certificate. This obviously excludes all institutions from the advantage of government aid if a certificated science teacher is not in the neighbourhood, or if it is impracticable to make arrangements with one. But it is well known that many of the subjects forming part of the science and art scheme have been for some years taught in Mechanics' Institutions by persons in various professions and occupations, who, in many cases, would not be likely to prepare for the examination required to entitle them to obtain any government recognition of their labours. As the funds administered by the Department of Science and Art are national, and only applied to the fostering of scientific instruction on economic grounds, we are entitled to criticise not only the details of management, but to consider it in relation to the fundamental principles of the grant. Now the ground on which the Government is warranted in employing national funds to promote the special education of persons of all ages, adults as well as youths, in certain branches of art and physical science, is, that such instruction is needed to supply an alleged and generally acknowledged deficiency, which deficiency is most prejudicial to our manufacturing skill. It is contended that if there were in our shops and factories, and especially in those districts where art workmanship may so largely enhance the value of production, a good proportion of persons conversant with the scientific principles of the work they are engaged in, familiar with the leading canons of art, and possessing some facility in drawing and modelling, the introduction of this cultivated class would raise the standard of our manufactures, while promoting their economy.

As the funds are derived from the country at large, every district where they can be applied usefully should have a fair opportunity of sharing in the advantage of their distribution. Moreover, as the Government does not profess to conduct the instruction, or to provide all the funds, but only to aid local action, it is reasonable to ask that such assistance be rendered in any and every case where the instruction desired is imparted, subject to the test of examination, and to needful verification, but with the least possible official complication, always embarrassing, and too often obstructive. Accepting this as a basis, three modes of action may be taken, two of which have been adopted: a training school or college for teachers—this for art masters was for some years in operation, and still exists in a modified form—a similar institution for science teachers has not been formed, but the acquisition of the requisite attainments has been fostered by the examining and certifying teachers and offering them the prospect of earning certain allowances upon the results of their teaching. A third mode of promoting the diffusion of scientific knowledge would be by making an allowance to any teacher who produces pupils capable of passing the annual examination, subject to the same local guarantee of the conditions required being fulfilled as exists already.

Supposing the present scheme adhered to, wholly, or in part, it would be practicable to extend its usefulness by substituting one general examination, the passing which might be held a sufficient guarantee of a teacher's power; leaving it to the results which must be produced to secure adequate attention to special subjects of instruction. This plan would at least yield evidence of sound culture such as at present the department totally and perhaps very mischievously ignores. A teacher, having passed this general examination, might then teach any of the subjects on the list, and receive by direct payment the allowance on results. The examination and granting certificates in special subjects might be maintained; for many teachers, devoting themselves to science, would find the advantage of systematic training for the test, and of the reputation the certificate would confer.

But recurring to the fundamental object of the grant, the diffusion of instruction in science and art, and considering that the funds applied to the purpose are derived from the whole country, it is obviously only fair that a few reasonable conditions being insisted on, any neighbourhood should be allowed to participate in the benefit of the grant while helping to diffuse the knowledge it was mrde to promote. This could be carried out simply and efficiently by saying that payments on results would be made for the pupils of any classes conducted under the supervision of a properly constituted committee. If the payment were made to or through the committee it would be in their power to take advantage of any teaching ability attainable, and it would offer the further advantage of grouping pupils and having instruction in various stages carried on concurrently by different teachers. If, as often happens, some competent teacher would give instruction gratuitously, the committee could appropriate any funds accruing on the results, presented by the pupils so taught, for aiding to obtain instruction in other classes.

Under the existing arrangement it is impracticable to utilise all the teaching power of the certified science masters. A man qualified to teach chemistry will usually possess considerable knowledge of some branches

of natural philosophy, and be able to impart instruction in the elements of the mathematics. Unless, however, he has secured a certificate in every subject he undertakes to teach, his instruction is deprived of the encouragement the Government professes to give, no matter how successfully he may teach, or how satisfactory the results may be. It often happens that there are few pupils offering for the subject in which a teacher holds a certificate, while there are many for other branches of science; and in these respects the system is as unsatisfactory to the teacher, as it is inequitable, and calculated to defeat its own object. Perhaps the identification of certificated masters with the department might be preserved by making all payments on the results of their teaching to them personally, instead of through a managing committee as suggested for non-certified masters.

Another most important question arises relatives to the class limitation of the grant in respect to its bearing on national industrial culture. Is it desirable that allowances should only be made on results as produced by the working classes and their children? That it is most desirable to secure for a large section—as large as possible—of the working classes the advantage of scientific culture likely to bear on their daily occupation is an admission involved in the constitution of the Department of Science and Art. Were it not so the existence of much of its costly machinery would betray a wanton expenditure of public money. But falling back on the principle that the sole ground of justification for thus aiding special education is that it is likely to be conducive to national advantage by improving our manufactures, economising their production, and fitting them to rival in taste as well as use those of other countries, we may ask are the actual working people those who alone contribute their skill to bring this about? As there is a middle class socially, there is a similar class in industrial production. The designer, the overlooker, foreman, general manager, operative chemist, the mine steward, and many others fulfilling most important duties in connection with productive industry, though not directly classed as operatives, usually spring from them, or have raised themselves from their ranks. Such men, all more or less, share in the manual part of production, but always under conditions to which considerable intelligence and often much special knowledge are essential. They are really the captains of industry, and to exclude them and their offspring from the benefit of any public endowment for promoting the higher branches of industrial education seems not merely an oversight but a fatal mistake. For it is to be borne in mind that the public advantages of diffusing scientific culture are not designed for its recipients alone: indeed the main purpose of aiding its diffusion regards the pupils so taught chiefly as agents to effect a great national good, while, in most cases, being themselves personally benefited by the instruction. It may be alleged that the better paid class connected with manufacturing, and engaged in Art-workmanship, can and will pay for the special instruction they require. This may be true in cases where such instruction is indispensable to their occupation or pretty sure to lead to direct advantages. But where it is uncertain whether a youth or a young man will find any engagement in which his scientific knowledge can be made reproductive, by increased income or improved position, he will hesitate to incur any expense for such instruction.

Now the children of the class under consideration have usually received a good preliminary education, and they have intellectual aspirations which will induce them to avail themselves of such opportunities as science classes offer. If they attend such classes the teachers find that although these young people may prove the most diligent and successful students, they bring no pecuniary advantage, as the results of their study are not recognized. Such pupils can scarcely be regarded with favour by the teacher unless they pay a remunerative fee, or their fathers for them; and as has been already stated, experience has shown that the ulterior advantage is too precarious and contingent to induce them to study and pay for it in full. Hence it appears that a great expansion of the present scheme is called for to admit the class under consideration to its benefits. Supposing it desirable to impose a limit on the persons for the results of whose scientific instruction the Government may reasonably be asked to pay, it is suggested that this might be fixed for students at an income not exceeding that of the highest paid skilled artisans of their neighbourhood, while in respect to sons and dependents, several positive claims might be recognised, much more likely to work well than the arbitrary exclusion of all paying income tax, whether pupils or parents and guardians.

The preliminary examination of pupils is another matter deserving careful consideration. It is seldom possible to make any useful application of special knowledge if its possessor is deficient in elementary instruction. This is so obvious that the Society of Arts have always required the candidates for their certificate to pass a preliminary examination. Several remarks of the Government examiners, the experience of the local committees, the vexation and loss to the teachers in having intelligent pupils incompetent to write legibly, spell correctly, express themselves accurately, or work a sum in proportion, and the bitter disappointment of the pupils themselves, combine to raise the question whether elementary knowledge should not be insisted on. Short, however, of insisting on a preliminary examination, it is manifestly the duty of committees and of the friends and advisers of the pupils to impress on them the urgent need of acquiring a moderate familiarity with the elements of instruction before seeking special scientific knowledge. There can be no doubt that much of the reluctance of pupils to enter upon the examinations is occasioned by a consciousness of what may be broadly designated as literary deficiencies. Perhaps one of the most signal advantages of the recognition by the Government of results and payments thereon in respect to science teaching, no matter by whom imparted, would be found in the more immediate relation of the teachers to the committees and institution. Supposing several branches of science to be conducted by one teacher, or, still better, that the whole of this department of a public educational institution were under the direction of one master, teaching alone, or with assistance, in either case, while noting the ignorance so obstructive of higher attainments, it would be to his interest to use his knowledge and influence to promote the needful preliminary training of the pupils upon a progressive and systematic plan. Much of the reluctance of pupils to enter upon the elementary course most desirable as a preparation for certain studies, or the more important acquisitions, in mathematics for instance, absolutely necessary for the due comprehension of most branches of physical science, arises from their impatience of what in their ignorance seems a needless drudgery; this reluctance might easily be dispelled by friendly counsel. Unfortunately, under the present system, the certified teacher often comes from a distance, and has no connexion with the Institution, no interest in the pupils but what may arise from attendance at a single class. Whether, then, by insisting on examination previously to pupils entering science classes, or by explanation and advice tendered by those whose position would give them the weight of authority, it is certainly of the utmost importance that a standard of attainment should be secured such as is at present only found exceptionally in the students of these classes.

ADULTERATION.

At the Pharmaceutical Conference, held at Nottingham, during the meeting of the British Association there, Mr. John Tuck exhibited, at one of the *soirées*, an interesting series of samples of adulterating materials,

placed at his service by the Hon. Board of Inland Revenue:—

1. "Original Indian Essence," consisting of methylated spirit, of a strength of 70·1 under proof, and treacle. 2. "Indian Tincture," consisting of methylated sweet nitre and treacle." 3. "The only original highly medicated and cordialised Indian Brandee," consisting of treacle and methylated spirit, of a strength of 47·3 under proof. 4. "Indian Brandee," consisting of methylated spirit, hyponitrous ether, and treacle. These four samples were sold as medicines, under the quoted names, but such compounds are in reality manufactured to be sold for beverages, and extensively used for this purpose in Lancashire and Yorkshire. The presence of methylated spirit in these compounds is clearly shown both by the iodo-hydrargyride of potassium and oxidation tests, as detailed in a paper read at the Birmingham meeting of the British Pharmaceutical Conference. 5. "Whiskee," containing methylated spirit of a strength of 60·0 under proof. 6. "Essence of Ginger," containing methylated spirit. These two samples were taken from a large quantity of spirits sold by public auction in Dublin, and when found to contain methylated spirit were seized by the Inland Revenue authorities. 7 and 21. Glucose, consisting of starch, sugar, and gum, and extensively employed in the manufacture of confectionary, and for the adulteration of jams and marmalade. It comes chiefly from France, and is made from potato or wheat starch. 8 and 9. Concentrated ale and porter wort, manufactured by the Concentrated Wort Company of Margate, to which has been given the name of "Grainstone." This concentrated wort is made of malt and hops, in the ordinary way, and reduced by a patent process to a solid hard substance. To convert this substance into beer, porter, ale, or stout, more or less water has to be added, according to the strength required, and when thus liquefied, it is fermented and racked off into casks, in exactly the same way as ordinary beer is brewed. The "grainstone" is exported in the solid state, in square tin cases, so that the heavy cost of the carriage of the water in ordinary beer is thus avoided; and, being hermetically sealed up, it will keep good without deteriorating or losing any of its qualities for years. Two pounds of this grainstone to every gallon of water makes a good beer. 10. Adulterant for porter, consisting of treacle extracted from sugar bags and refuse of sugar refineries. There is reason to believe that this species of adulteration is practised a good deal both in London and in the country. 11. Beer adulterant, consisting of spent hops, which contain a large proportion of grains of Paradise. 12. Beer adulterant, consisting of ground capsicum, starch, and sugar. This was discovered at Stockton-on-Tees. 13. Cavendish tobacco of foreign manufacture, adulterated with liquorice. This is found chiefly in seaport towns, and consumed principally by sailors. 14. Roll tobacco, adulterated with cabbage leaf. This sample was purchased in Glasgow. 15. Tobacco leaf in process of manufacture, adulterated with 19 per cent. of sugar. This was seized in a manufactory at Newcastle-on-Tyne. 16. High-dried or Irish snuff, containing upwards of 20 per cent. of caustic lime. This was obtained from Belfast. 17. "Snuff," coarsely ground, containing 2 per cent. of rhubarb leaf. The bulk of this snuff weighed several tons. Snuff is most extensively adulterated, and the following are some of the vegetable materials that have been used for this vile purpose, and seized by the Excise authorities:—Rhubarb leaves in several cases, acorns, dock leaves, sawdust, spent dyewoods, rhubarb, and coltsfoot leaves, the "comings" of malt, rhubarb, and potato leaves, coltsfoot and other plants, British tealeaves, &c. These adulterants are principally detected by the microscope. Amongst the mineral adulterants, the most injurious to health are the salts of lead; and if some of the others, such as salt, red ochre, chalk, lime, silica, &c., are not so injurious, they nevertheless defraud the revenue of considerable sums annually. 18. Hamburgh wine, a sophisticated wine, made to imitate sherry, and at one time extensively imported from Hamburg and other German port. This fraudulent practice is now, however, much checked. 19. Cadiz sherry wine of low quality, containing 50 per cent. of proof spirit, used for the fortification of wine to suit the English markets. 20. Methylated spirit purified from oil by a process patented by Mr. J. Watson Burton, of Leeds.

FRENCH INDUSTRY AND THE TREATY OF COMMERCE.

The following memorandum, issued by the Board of Trade, exhibits the progress of some of the most important branches of French industry since the conclusion of the Treaty of Commerce with Great Britain in 1860:—

It was loudly and constantly urged by the French Protectionists that the Treaty of Commerce between Great Britain and France, in 1860, would, by inundating the French market with British manufactures, effect the destruction of some of the national industries of France.

The extent of the difference between the thus anticipated and the actual results will be broadly shown by the following statements, the figures of which are entirely obtained from the French official returns.

It may be premised that, for general purposes of demonstration, one of the best indications of the prosperity of a national branch of industry is the increased extent to which the products of that branch of production are exported, as well as that of the importation of raw material, in cases where the manufacture is not incident to an article of native produce.

It may also be assumed that the extinction of exportation must generally precede the cessation of production for home consumption.

Judged by these, the only true standards applicable to such a question, we find conclusive evidence of the complete unsoundness of the Protectionist doctrine, whether we examine the aggregate or the special exports of France before and since the conclusion of the treaty in question.

The total value of exports from France of objects of French manufacture generally during the period from 1859 to 1864 have been as follows:—

	Francs.
1859	2,266,400,000
1860	2,277,100,000
1861	1,926,300,000
1862	2,242,700,000
1863	2,642,600,000
1864	2,924,200,000

Representing an increase of 657,800,000 francs for the year 1864, as compared with the first year of the period, whilst a glance at the return shows how little spasmodic is the character of the increase.

If we examine some of the constituent items of the above statement, the return is no less satisfactory to those industrial interests of France which it was presumed were most exposed to injury by the treaty.

With regard, first, to the French textile manufactures, the figures appended will show that those branches, viz., cotton, woollen and linen, of the industries, which were believed to be most vulnerable to free trade, and likely to suffer most from the action of the treaty, have maintained not only a regular increase, but have, in certain cases, made a starling progress.

COTTONS.

Value of exports from France of woven cotton goods of French manufacture during the following years:—

	Francs.
1859	67,200,000
1860	69,600,000
1861	56,400,000
1862	63,300,000
1863	88,200,000
1864	93,700,000

Being an increase of nearly 26,000,000 francs during a period of unexampled disturbance of the trade, and in face of the unprecedented obstacles arising from the American war.

LINENS.

The development of the export linen trade of France is also deserving of notice, especially under the circumstances of its existence in a country which must import, almost entirely, its supplies of the raw material from the two great flax-producing and linen manufacturing countries of Europe, viz., Great Britain and Belgium.

Value of exports from France of linen woven goods of French manufacture:—

	Francs.
1859	15,400,000
1860	15,400,000
1861	14,900,000
1862	14,700,000
1863	19,000,000
1864	24,500,000

Showing an increase of more than 9,000,000 francs, or more than one-half.

The woollen industries of France, which it was held would be annihilated by the treaty, have prospered, since 1860, in a most remarkable degree, the exports having absolutely almost doubled since that year, as is shown by the following statement.

Value of exports from France of woollen woven goods of French manufacture:—

	Francs.
1859	180,600,000
1860	229,300,000
1861	188,000,000
1862	221,700,000
1863	293,600,000
1864	355,900,000

It may be as well to mention that this industry had been almost stationary in France during the six preceding years.

YARNS.

The increase in the exportation of yarns is no less remarkable than that indicated with regard to the woven goods.

These are the amounts for the respective years:—

	Cotton and Woollen. Francs.		Hemp and Flax. Francs.
1859	6,900,000	....	1,000,000
1860	10,300,000	....	2,300,000
1861	7,600,000	....	1,600,000
1862	14,200,000	....	3,100,000
1863	17,100,000	....	26,600,000
1864	21,600,000	....	21,500,000

The above figures do not need comment as to the comparative effect of the treaty on the French producers of yarns; the statement is most conclusive.

It is, perhaps, almost unnecessary to observe that, in the period under review, the prices of all the above articles have been unusually high, and have therefore tended to check the natural development of the trade.

METAL GOODS.

Instead of destroying the metallic industries of France, the treaty has unquestionably tended to promote them. It must be borne in mind that France is by nature less endowed than probably any European country with the necessary capability, as respects native material, of supporting foreign competition in this particular industry.

The exports of metal goods, excluding machinery, have been as follows:—

	Francs.
1859	43,700,000
1860	45,700,000
1861	39,700,000
1862	41,900,000
1863	43,700,000
1864	45,100,000

Of machinery the following have been the exports during the corresponding period:—

	Francs.
1859	6,800,000
1860	8,300,000
1861	7,300,000
1862	8,300,000
1863	7,500,000
1864	9,500,000

CHEMICALS.

In estimating the value of the above figures as indications of the progress of this trade, it may be remarked that the value of the exports for 1859 were very considerably above the average, in fact largely in excess of the export of any previous year.

Notwithstanding the very extensive reductions effected by the French Tariff of 1860 on chemical products, the exportation of such articles of French manufacture has, by its large increase, triumphantly refuted the protectionist prophecies.

These are the figures:—

Value of exports of chemicals of French manufacture:—

	Francs.
1859	32,700,000
1860	35,400,000
1861	36,600,000
1862	54,400,000
1863	49,300,000
1864	54,400,000

FISH.

It will be doubtless well remembered that the question of the reduction of the French duties on fish created a memorable discussion, in which other than the simple commercial interests were involved, as it had been held that the prohibitory nature of the tariff meant protection to the Imperial navy, as well as to the fishermen of France. The results of the reduction are here exhibited.

Value of French salted fish, &c., exported.

	Francs.
1859	11,500,000
1860	8,800,000
1861	13,000,000
1862	11,900,000
1863	16,100,000
1864	15,200,000

The amount exported in 1859 was unusually large, a remarkable fact considering the variable nature of the fishing seasons.

It has here been most plainly shown how rotten was the foundation of the Protectionist doctrine, that French manufactures would go to the wall when subjected to the competition which would result from the treaty. The issue, instead of destruction to the French manufactures, has been, by the removal of encumbrances (some of which, being indirect in their pressure, were not assignable with precision), to enlarge the extent to which France was able to meet competition, not only in her own, but actually in foreign markets, to an extent and with a rapidity that the most sanguine expectations could have hardly anticipated.

In conclusion, it may be observed that, since France inaugurated her free trade movement by the reduction of her tariff on British manufactures consequent on the treaty with Great Britain, her Government has, with the almost entire approval of the French nation, made constant efforts to establish similar relations with other countries.

Practically this may be regarded as the most satisfactory evidence of the results of the abolition by France of protective Customs duties; the figures above given show how sound the conclusion is.

If we proceed to examine the figures of the exportation from France to Great Britain of the articles in question, the result is still more striking. Instead of the French market being inundated with British manufactures of

these kinds, the amount exported from France to the United Kingdom has vastly increased, as the following figures will most plainly indicate.

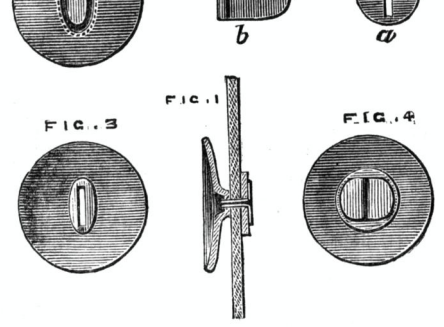
Real value of the following articles of French manufacture exported from France to Great Britain in the years 1859-64:—

	1859. Francs.		1864. Francs.
Woollens.....	39,178,000	..	98,512,000
Linens.....	3,331,000	..	3,103,000
Cottons	5,742,000	..	12,671,000
Metal goods ..	4,395,000	..	8,912,000
Yarns	406,000	..	8,842,000
Earthenware, Glass, &c., ..	4,398,000	..	5,993,000
Fish, salted, &c.	1,061,000	..	3,213,000

Thus it has been most distinctly shown, not only that the industries which the treaty was to annihilate have acquired a higher position than ever, but that the relations of those particular industries towards Great Britain have made a progress and assumed an importance unknown previously to the existence of the treaty, to which it may be without hesitation be alleged they owe mainly the extraordinary development they have since attained.

SELF-FASTENING BUTTONS.

Numerous attempts have been made at various times to introduce a method of securing buttons on clothing which should supersede the process of sewing. Hitherto the object has not been effected, owing to several drawbacks which have arisen to bar the practical application of a mechanical fastening. Mr. H. W. Hart proposes to overcome this by an invention he has just made, which consists in constructing buttons with shanks formed of a strip of metal or wire, upon the principle of Hart's well-known paper fastener, and provided with a washer made with an aperture just large enough to allow of the two plates of the shank when in contact passing through it. The plates or wires are of such metal as allows of their being bent without breaking. Fig. 1 of the accompanying engraving is a section of a button constructed



according to this invention and applied to a piece of cloth; figs. 2 and 3 are views of two different sides; fig. 4 shows the button with a washer; *a* is the washer, and *b* is the metal plate forming the button shank. To attach the button, remove the washer *a*, insert the shank *b* through the material to which the button is to be fixed, apply the washer and pass it down the shank, separate the two plates or wires of the shank *b*, and turn them down close on the washer *a*, as seen in fig. 1. For the sake of neatness, the length of the plates of the shank *b* should be such that when bent down on the washer *a*, they should not extend beyond its edges.

Fine Arts.

PICTURE CLEANING: NATIONAL GALLERY.—During the recess, while the National Gallery has been closed, several pictures have undergone the process of cleaning. It is now a considerable time since a like attempt was made. Thirteen years ago no less than 14 pictures were consigned to Mr. Seguier, of which number 12 were actually cleaned during the summer vacation of six weeks. The operation led to a Parliamentary inquiry and considerable public discussion. Sir Charles Eastlake, then President of the Royal Academy, and ex-officio trustee of the National Gallery, gave before the committee the following evidence:—"I consider the pictures were in a state to require cleaning, but I should not have recommended them to be cleaned, nor did I. Since I have been a trustee propositions have been brought forward almost periodically for cleaning pictures, and I have always opposed such propositions." The question was then asked, "On what ground has such opposition been made?" To which was given the following reply: "Because the cleaning of pictures is a subject which admits of no proof, and it is one on which the public mind may be easily unsettled. It was not because I thought that the pictures did not require cleaning." This evidence may explain why there was so little picture cleaning under the directorship of the late Sir Charles Eastlake. It may also be received in proof of the generally admitted fact that many pictures in the national collection require cleaning. Two years ago an intermediate method, known as "the Pettenkofer Process," was used "for refreshing the varnish" of certain pictures. But though in this process the "partial opacity in the superficial varnish" was overcome, the old varnish still remained, and with it necessarily some dirt. The method this year applied to certain other pictures is more thorough; it differs indeed but little, if at all, from the process long employed by picture cleaners. Its effect on a "Landscape with Mercury and the dishonest Woodman," painted by Salvator Rosa two centuries ago, has been examined. This picture, which thirty years since was purchased for the National Gallery, is now seen for the first time distinct in detail, and transparent in shadow, in a condition not very different from that in which it left the artist's easel. Salvator Rosa painted with a firm hand, solidly; he used sparingly, if indeed at all, thin glazing colours. It is just such pictures that can be cleaned with impunity. Other works which have also been in the cleaner's hands will speak for themselves on the approaching re-opening of the gallery.

WINTER EXHIBITIONS.—The Institute of Painters in Water Colours, following the example set by the elder society, will open a first winter exhibition for sketches and studies, by members and associates, on Monday next. On the same day Mr. Gambart commences his annual winter exhibition of cabinet pictures of British artists in the French Gallery. Also, on the same day, Mr. Wallis opens his annual winter exhibition in the Suffolk-street Gallery, and Mr. McLean a second annual exhibition in the Haymarket. On the following Monday, 12th November, will open the second winter exhibition of water-colour drawings in the German Gallery. The private views of these several exhibitions are on the Saturday which precedes the public opening.

BRITISH MUSEUM.—A guide to the first vase room has recently been issued by Mr. Newton, the keeper of the Greek and Roman antiquities. The vases themselves have been critically examined and chronologically arranged, and many labels are attached, which, by determining dates, subjects, and styles, facilitate study. Those who are acquainted with similar collections in Naples, Florence, and other cities, having felt the need, will know how to estimate the advantage of such aids. There are few greater difficulties in art or archæology than those which beset the student of Etruscan, or

rather, Greek vases, and yet few lines of investigation offer greater pleasure or reward. When the re-arrangement of the collection, now far advanced, shall be complete, there will probably be no place in Europe where such studies can be prosecuted with the same facility as in the British Museum. In Naples may be found a magnificent collection in confusion, but Italian antiquaries want the knowledge and critical accuracy needful to elucidate the treasures dug from their own soil. Mr. Newton has classified the Greek fictile art in our Museum under the three following periods:—1st, the Archaic, extending from the commencement of Greek civilization to B.C. 440; 2nd, the period of finest art, from B.C. 440 to B.C. 336, the date of the accession of Alexander the Great; 3rd, the Macedonian period, from B.C. 336 to B.C. 100, about which time the art of painting vases probably ceased to be practised. The vases, which, in the first room, are mostly from Italy, have been placed in unbroken chronological series. It has been thought, however, desirable that the classification based on time should be supplemented by one of locality. Therefore the Athenian, Sicilian, and Rhodian vases have been arranged separately, in order that the student may more clearly distinguish the local peculiarities of style.

DECORATIONS OF THE TUILERIES.—Some time since mention was made in the *Journal* of the elaborate decorative works executed for the Pavilion of Flora, the corner tower of the Tuileries facing the river, and the wing which will connect the pavilion with the gallery of the Louvre, both of which have been entirely rebuilt within a comparatively short period. The former notice had reference principally to the river front; the following refers to the façade looking upon the great court of the palace, and the Place du Carrousel, which has just been disembarrassed of its scaffolding and thrown open to public view. The two stories of this building contain thirty-six niches, and each is filled with a statue. The following is the list of subjects with the names of the sculptors:—"A Flute Player," by M. Lévêque; "A Labourer," by Iguel; "A Greek, and an Etruscan Warrior," by Grugère; "A Slinger," by Forgeot; "The Wrestler," by Marcelin; "Castor and Pollux," by Petit; "Meleager," by Travaux; "Adonis," by Allasseur; "The Vintager," by Denécheau; "A Roman and a Frank Warrior," by Robinet; "Mercury," by Chambard; "A Fisherman and a Shepherd," by Chevalier; the above are all on the lower floor. On the upper story of the building are the following:—"Terpsichore," by M. Millet; "Abundance," by Prouda; "Minerva," by Maillet; "Ceres," by Chatrousse; "A Nymph, and a Naïad," by Salmson; "Pandora and Psyche," by Pollet; "Female Bather, and Fisher," by Cabet; "Hebe, and Daphne," by Oudiné; "Melpomene, and Euterpe," by Crank; "Erigone, and Circe," by Schœnewerk; "An Amazon," by Klagmann; "Venus," by Loison; and "Clio and Erato," by Soitoux. These statues are executed in stone, but they were entrusted to eminent artists; fifteen of the sculptors engaged in this elaborate decoration have received all the honours that the fine art juries have to give, four others are medallists, and only six are without such distinction.

Manufactures.

NEW COLOURING MATTERS AND PROCESSES.—In the application of indigo to dyeing it is necessary to render it soluble in alkaline and caustic mixtures by admixture with other substances; the reduction thus effected changes the colour of the indigo, which, however, is brought back afterwards by exposure to the air, of which it absorbs the oxygen. This process is accompanied in practice by serious difficulties; thus, if the indigo is reduced by fermentation with vegetable matters in a caustic ley (as in the hot process) the various acids resolved during the fermentation combine with the alkali, and the mixture ceases to be caustic, and no longer holds the reduced indigo in solution, so that the dyer is compelled to add from time to time small quantities of potash, soda, or lime; but if the addition is too small, a portion of the indigo is lost by decomposition, while if it be too great, a part of the indigo combines with the alkali, and forms an insoluble compound. M. Leuchs, of Nuremberg, says that all the difficulty vanishes by the use of *pectine*, for the conversion of the indigo. Pectine may be obtained in considerable quantities from radishes, citron, melons, and other vegetables and fruits, and these may even be employed in the place of the extracted pectine itself. The most simple form of the process recommended is to suspend an iron net or basket containing 20 pounds or so of fresh radishes cut into small pieces, in the hot caustic solution containing the powdered indigo, and then to continue the heat gradually to the boiling point. The indigo, it is said, soon loses its colour, and the solution, diluted with water deprived of its air, is ready for dyeing with. It is necessary, however, to avoid contact with the air as much as possible. When the dye stuff is exhausted it may be renewed by adding a little fresh indigo and caustic soda, and boiling as before with radishes. The simplicity and efficacy of the process may be thus illustrated; place a small quantity of powdered indigo, dissolved in a few drops of caustic potash or soda, in a test tube, and, adding a small piece of radish, let the mixture boil; the indigo will rapidly lose its colour and be dissolved, but on exposure to the air will soon recover its original tint. As radishes cannot be had in all seasons, M. Leuchs has succeeded in extracting all the active principles by boiling the roots in water under a pressure of two or three atmospheres. It is said that the extract of radish has already become an article of commerce. Two German chemists, named Martius and Griess, are said to have discovered a new basis, which they call amidodiphenylimide; this substance with the impossible name they believe to be identical with the aniline yellow obtained by the action of stannate of soda on an aniline salt; it dyes silk and wool of a citron colour, and, in combination with picric acid, gives a cochineal-like red to wool; when heated with aniline it produces a blue dye. It is prepared in the following manner:—A mixture composed of three parts of stannate of soda, one part of nitrate of aniline, and ten parts of water, with the addition from time to time of caustic soda, is heated to boiling point. As soon as a drop of the liquor becomes intensely red when acidified, the operation is stopped and the mixture allowed to cool. When oxide of tin in chlorhydric acid is added, a reddish brown resinous deposit is thrown down, which is dissolved in caustic soda, for the purpose of taking out the traces of phenic acid. Finally a liquor is obtained which is filtered, and to which a little ammonia is added to precipitate the amidodiphenylimide. For dyeing purposes this base is dissolved in a weak solution of chlorhydric acid. M. Tissandier has given much attention to the residue left in the retorts used for the production of gas from apple refuse, and has produced from it, by distillation, amongst other matters, a new colouring substance resembling aniline yellow. The colour is obtained by treating the residue in question with ordinary nitric acid, and is entirely soluble in ammonia and in alcohol, but only partially in water. The aqueous solution may be used as a dye without any mordant. The colour is said to be perfectly fast.

COMPOSITION OF VARIOUS MARBLES.—The Society of Emulation of the Jura sometime since placed in the hands of M. Ch. Mène a collection of calcareous products of that locality for analysis, and that gentleman has extended his examination to the fine marbles of the country, which are extensively used in France. The principal specimens, of which the analyses are published, are the marbles of Molinges, Molessard, Saint Amour, Crans, Chassal, Saint Ylie, Consance, Villette les Cornod, Pratz,

Damparis, and Nantey, and the similarity of the composition of these marbles is very striking. With the exception of one or two samples the proportions of the main elements are almost identical; the amount of lime varies only within the limits of 505 to 550 parts in a thousand, and that of carbonic acid between 397 and 433. The quantity of clay has a wider range, one specimen containing only ·004, and another ·076, but in a sample of the grey marble of Rotalier, M. Mène found no less than ·150 of clay, but he considers that this belongs to the inferior oolite, and cannot possess much durability. The colours of the Jura marbles are very various, ranging from light grey to dark red, but the colouring matters vary but little; thus we find in the analysis of the yellow marble of Molinges ·002 parts of peroxyde of iron, while the violet-coloured marble of the same locality exhibits ·005 of the same substance; the yellow marble of St. Amour gives ·009 oxyde of iron, while the rose and violet coloured varieties of the same district give almost precisely the same results, while a fourth variety, a veined marble of a deep red colour, exhibits only ·005 of the same. In other cases the oxyde of iron amounts to ·022, while in others there is no trace of it, or very slight traces. In three instances the iron takes the form of peroxyde or protoxyde, in proportions varying between ·002 and ·005, and in one case both are found together. Seeing that the analyses are all quantitative, and that the loss rarely exceeds ·005, and in several instances is nothing at all, it is evident that the great variety of colours cannot depend solely on the presence and proportions of the metallic salts, especially as they all have iron for their basis. There is only one other element in the analyses to account, materially, for the variety of colour, namely, organic matter; but out of twenty or more cases more than half present no trace of such substances, and in the other instances the proportions are extremely minute, ranging only from ·002 to ·008. The varying tints of these marbles, which include grey, yellow, rose, violet, and deep red, offer an interesting problem for the mineralogist — is chemical analysis incapable of detecting the minute matters which cause these great differences in colour, or have the agents disappeared, and left only the marks of their presence in the various tints? One kind of Jura marble, that with veins and stains varying betweeen yellow and brown, has been largely used in Paris for the balustrades of bridges, basins, and other parts of fountains, plinths, steps, and other purposes, and its warm tint presents a very effective contrast to white stone and harmonises well with bronze in the case of candelabra. M. Mène speaks of one of his specimens, the marble of Molessard, as presenting a very singular effect; the colour is yellowish grey, and the surface, when polished, presents a great variety of fossils, as well as calcareous crystals; he thinks it well adapted for small objects. The museum of Lons-le-Saumier possesses a collection of specimens of the marbles of the Jura, which are locally classed, according to colour, under the arbitrary names of deep yellow brocatel, or gilt Arabie, light yellow brocatel, violet and rose brocatel, *Jaune fleuri*, *Jaune Lamartine*, and *Jaune rosé*. An important work by the Rev. Father Ogerieu, Director of the Superior Schools of Lons-le Saumier, who was entrusted with the work by the Consul-General of the department, is now in the press, and will give full information on the geological formation of the Jura, and on the extent of the quarries where these marbles are found, together with the analyses of M. Mène.

Commerce.

THE WEST INDIA SPONGE FISHERY. — At present, perhaps owing to the large reduction in the collection and exportation during the late war in the United States, the supply of Bahamas sponge is not equal to the demand, and prices rule high. In the ten years ending 1864 the average export was 3,330 cwt. per annum, valued at £17,369. But four or five years ago as much as 5,000 to 6,000 cwt. were shipped from those islands. Bahamas sponge is inferior to the Mediterranean kinds, and a quarter of a century ago it was of little value. It was simply classed as coarse and fine, the former including the qualities now known as velvet, sheepwool, and grass, and selling for four to five dollars the cwt., the fine, or glove sponge, at 10 dollars. Now it is divided into the eight following classes, to each of which is affixed the average price per lb. which it fetched in 1864:—1st, common, or boat sponge, with white or yellow tissue, called in the island sheepwool, and in America carriage sponge; 2nd, common, or velvet sponge, with brown tissue; 3rd, large fine brown (fine hard-head), all these three 1s. 8d. per lb.; 4th, large coarse brown (coarse hardhead), 10d. per lb.; 5th, common coarse, or grass sponge, 4d. per lb.; 6th, large fine, soft tissue, not strong, called glove sponge, 4d. per lb.; 7th, small fine, soft tissue and good forms, called beef sponge, 2s. 6d. per lb.; 8th, small fine, hard tissue (small fine, hard-head, or hard brown) best quality, also often called beef sponge, 1s. 3d. per lb. Of late years sponge has been applied to a great many new purposes. The price of some qualities has doubled, of others quadrupled, and of some, such as velvet and sheepwool, for which apparently there could have been no foreign demand, the price is ten times greater than formerly. Large quantities of all the above kinds are sent to the United States, of the velvet and glove sponge to England, while France takes the finest qualities. They there undergo a final operation of cleaning and dyeing.

VEGETABLE MATTERS USED BY THE CHINESE IN PLACE OF SOAP.—M. Paul Champion, an engineer of the Ecole Centrale, who has recently returned from China, has brought with him a collection of substances and products in common use in that country, but which present certain points of interest in Europe. Amongst the rest are the fruit or seed pods of a leguminous plant from Shanghai, which are commonly used in several provinces in place of soap. The greater part of the epicarp is removed with a knife, and the wet linen is then rubbed with the peeled pods. The subject is an interesting one, and M. Payen, the chemist, has examined the specimens brought home by M. Champion, and has reported upon them to the Academy of Sciences. The fruits or pods in question vary in length from two to three inches, and sometimes exceed the latter, and in width from an inch to an inch and a quarter, being about the size of the pod of a Windsor bean; they contain from two to five globular seeds, of a brown colour; and M. Decaise, of the Institut, considers the plant producing them to be a *dialium*. M. Payen has examined these pods minutely, with the aid of the microscope and chemical tests, and says that they possess some remarkable peculiarities; the pericarp contains several principles very distinctly marked, such as grains of starch, azotized fatty and mineral matters, and saponine, or a substance closely resembling it, which produces a lather by agitation with water, and is soluble in alcohol, especially with the aid of heat. The substance in question has the same property as soap, of insinuating itself with the aid of water between the fibres of fabrics, and of destroying the adhesion between them and any foreign matter; in short, the pods produce, in a very economical manner, a part of the effect of common soaps. The seeds of the plant, which have a very hard brown envelope, present, scientifically, curious peculiarities in the perisperm which surrounds the embryo plant, and which differs in many respects from those of other leguminous seeds; and M. Payen has given the name *dialose* to the peculiar element which he believes he has discovered in its composition. M. Champion also brought another pod from China, which is used for the same purpose; this belongs to the family of the *Gleditschia*. These pods are much longer, measuring from six to eleven inches, but generally less than an inch in width; the seeds are of a reddish colour, and become loose when

ripe; whereas those of the kind described above are fixed firmly to the fibres of the pod; and the composition of the pod is different in many respects. It contains no starch, and the envelope of the seed is different in more than one respect, but it has a perisperm which closely resembles that of the seeds of the dialium, and the puffy portion of the pod possesses the same principle analogous to saponine. In conclusion, M. Payen observed that apart from the economical application alluded to, these pods exhibit the somewhat rare peculiarity of a new secretion found in a peculiar tissue of a perisperm, remarkable both as regards its structure and composition. If M. Payen is correct in his deductions, and his authority in such matters is great, this saponaceous principle may probably be found in the pods of other leguminous plants.

THE BEET SUGAR CROPS.—The *Journal des Fabricants de Sucre* sums up the prospects of the French crop as follows:—"The falling off in the quantity of roots will be much less than was at one time feared, but on the other hand the yield of sugar will be considerably below the estimates. The average yield of sugar in 1865-6 was 6½ per cent. This year the yield will hardly be 5 per cent. It is then probable that our lowest estimate of 200,000 tons will not be exceeded, and it will not be reached if the bad results obtained hitherto prove to be general." Of the Russian crop, Herr Robert Burger, of Magdeburg, reports most favourably. He states that there can be no doubt that the yield will be much larger than in the preceding season, and this fact is of considerable importance to England, as large supplies of refined sugar were sent from Holland to Russia last year, thus tending to support prices in our market. According to the same report the Polish crop will be 15,000 tons against 16,500 tons last season. The Russian crop, it appears, is difficult to estimate, and a yield of 80,000 tons is as probable as one of 60,000 tons. The reports from the Zollverein are less favourable, and it is thought that the yield may be less than the 200,00 tons named.

BEET SUGAR VERSUS CANE.—The *Produce Markets Review* says:—"Until very recently it was generally supposed that cane was preferable to beet sugar for refining purposes, but a contrary opinion appears to be now gaining ground. It is well known, for instance, that the Parisian refiners give higher prices for beet than they do for cane sugar, and the decision arrived at by our continental neighbours is said to be confirmed by the practice of the Clyde refiners. It is also evident that even the London refiners are awakening to the fact of the desirability of using beet for refining purposes. It may seem remarkable that, notwithstanding its deficiency in sweetening power, beet sugar should, for refining purposes, be preferred to that from the cane, and that it should actually give a greater yield of refined sugar. The question as to how this result occurs is difficult of solution, but there can be little doubt that it it is mainly caused by the imperfect manufacture of the cane. The principal reason of the superior preparation of beet root sugar is that the salts contained in the root are extremely nauseous, and that unless they are thoroughly eradicated, the sugar produced is altogether unpalatable, besides being uncrystallizable. The beet root manufacturers are therefore forced to prepare good sugar free from salts; and this, to a great extent, involves the absence of molasses, and fructose or glucose, or, in other words, uncrystallizable sugar. The colonial growers, on the other hand, are not forced to get rid of the salts and other impurities, because they are not so nauseous as in the beetroot; and their mode of manufacture is extremely imperfect. Large quantities of uncrystallizable substances are left in the sugar in the shape of fructose or glucose, and these impurities necessarily diminish the yield of refined sugar. We cannot better conclude our remarks on the subject of the manufacture of cane sugar than by quoting a portion of a lecture delivered by Mr. Fryer, at Antigua, last year:—'All heat above 140 degs. is capable of exerting an injurious effect, and this effect is proportionate to the duration of the heat—the continuance of the syrup for two hours, at any given temperature, would do just double the amount of mischief which would be effected by its continuance at the same temperature for one hour—and this mischief consists partly in the change of colour, and partly in the change of a quantity of syrup, or sucrose, into fructose, and this injury to the juice is aggravated by the fact that every particle of fructose in a mixed solution detains from crystallization nearly its own weight of pure sugar—or, in other words, it would be impossible after mixing equal weights in solution of loaf sugar and fructose to recover the former in a crystallized state—the changes produced by the atmosphere alone, without the action of heat, show the necessity of proceeding instantly to raise the temperature to the boiling point, and the concentration should be continued without loss of time. The results arrived at by the polarising saccharometer show the gradual and rapidly increasing change of cane sugar into fructose, from the simmerer through the coppers in succession to the tache, the extreme limits of the change being in one case 17 per cent. of the sugar present. Remembering what is said above of the entangling action of fructose, this would represent an ultimate loss upon the production of 34 per cent.'"

THE GERMAN BEET CROP.—Herr F. O. Licht, of Magdeburg, has the following remarks on the prospects of this crop in his Circular for the month of October:—At the commencement of the season opinions are naturally much divided as to the crops. There are several districts, more especially in the neighbourhood of the Saal, where the state of the weather of late has been decidedly unfavourable both to the quantity and the quality of the roots. In other parts complaints are made about the small roots and large leaves. My estimates of this year's yield, which I fixed at 200,000 tons of raw sugar from a beet crop of 2,500,000 tons, I still consider correct, as its accuracy is to some extent confirmed by the correctness of previous estimates. At present, prospects are in favour of a good average crop, so should there be after all a failure in quantity, it can only be, as many have conjectured, in consequence of the luxuriant growth of the leaves. It must, however, be borne in mind that the two previous crops were 15 per cent., or more, below the average. If we reckon last season's crop of 2,250,000 tons as 15 per cent. below the average, the crop this season will be about 2,500,000 tons. But even supposing the yield to be not quite so favourable as in the previous season, we shall still have a yield of 1 cwt. of raw sugar for every 12·5 cwts. of roots against 11·7 cwts. of roots last season. The following is the latest estimate of the European crop furnished by Herr Robert Burger, of Magdeburg:—

	1866-67. Tons.	1865-66. Tons.
Zollverein	200,000	185,000
France	200,000	275,000
Russia	125,000	100,000
Austria	75,000	68,000
Belgium	30,000	41,500
Poland	15,000	16,500
Holland and Sweden	5,000	4,000
Total	650,000	690,000

CAMEO SHELLS.—The several varieties of the so-called conch shells (species of cassis and strombus) with which the shores of the Bahamas Islands abound, form an important article of export thence, and their collection affords a useful means of employment to the maritime and littoral population. They are chiefly sent to France. In the last three or four years the collection was somewhat interfered with by the more stirring trade carried on from Nassau during the American civil war, and the quantity shipped was reduced to one-half. From 1855 to 1860 the average value of the shells exported was upwards of £2,600, but from 1861 to 1865 the annual average was below £1,000.

COMMERCIAL PROSPECTS IN SPAIN.—In spite of some partial inundations the harvest of cereals, the produce of wine, of dried grapes, and of oil has been abundant enough to permit of large exportations by the new line of railway recently opened for traffic. The mineral products, those of mercury at Almaden, of copper at Rio Tinto, in Andalusia, and those of argentiferous lead in the whole of the sierra of Almeria, continue to furnish good results. The approaching opening of the universal exhibition at Paris has certainly caused a salutary excitement amongst the industrial, artistical, and agricultural classes in the Peninsula, and it is easily seen that each one desires to figure there with honour.

SALT AND TOBACCO IN ITALY IN 1864 AND 1865.—The sale of salt in 1864 amounted to 1,283,560 quintals 43 kilogrammes, or about 126,430 tons; in 1865, the amount sold was 1,157,169 quintals 28 kilogrammes, or about 113,980 tons. The results from this are, that the individual consumption was six kilogrammes 828 grammes in 1864, and six kilogrammes 157 grammes in 1865, and a relative revenue to the state of 2fr. 30c. and 2fr. 34c. Although there was a decrease in the consumption the revenue was augmented by the raising of the duty. The sale of tobacco has given the following results:—In 1864. the quantity of tobacco sold was 122,818 quintals 17 kilogrammes; in 1865, 110,721 quintals 35 kilogrammes, thus showing a decrease of 12,096 quintals 82 kilogrammes, or about 1,200 tons. The individual consumption was 632 grammes in 1684, and 571 in 1865, and a corresponding revenue per head of 3·893fr. and 3·898fr. Compared with the quantities consumed in France, it appears that the average individual consumption in Italy is less than that of France by 67 grammes for snuff, and 203 grammes for cut tobacco, whilst, on the other hand, it is inferior by 68 grammes in cigars. Altogether the individual consumption is considerably less in Italy than in France.

TELEGRAPHS IN ITALY.—The general administration of the telegraphs has just published the total amount of the receipts from the beginning of this year to the end of July. This amount, compared with the corresponding amount of last year, shows an increase of 251,634 frs.; the receipts from the 1st of January to the end of July, 1865, being 2,659,993 frs., and 2,911,628 frs. for 1866. It may be remarked, besides, that the exchange of international correspondence, which for the first three months of 1865 produced 181,327 frs., in 1865 for the first three months produced 331,888 frs., being thus an increase of 150,552 frs. These amounts bear witness to the development of commercial relations, both between the various provinces in Italy and between Italy and foreign countries.

Colonies.

STATE OF SOUTH AUSTRALIA. — According to the Government returns it appears that during the year 1865 no less than 316,476 acres of country and suburban land were alienated from the Crown, showing an increase of 91,315 acres over the purchase of the previous twelve months, thus making the total area of purchased land in occupation on the 31st December, 1865, 3,210,290 acres, or 20·5 acres for each individual of the estimated population at that date. Ten years ago the average amount was 15 acres per head. The area of the counties proclaimed up to the present time is 18,576,000 acres, of which about one-sixth part has been sold. Nearly two-thirds of the purchased land are in the hands of freeholders. The enclosures of land progress favourably, the total extent now being 3,854,315 acres, an addition of 355,217 acres during the present year. Deducting the area of land under cultivation from the above quantity, the extent of fenced pasturage will be found to amount to 3,193,746 acres, an increase of 282,423 acres during the year. 72,794 acres additional land were brought into cultivation during the past season, showing a very large increase as compared with the previous one. The total area now under cultivation is 660,569 acres, as compared with 587,775 acres in 1864–5, showing an increase of 12½ per cent., whilst the increase during the previous year was only 5 per cent. Four acres of tilled land is the rate per head for each individual of the population, or twelve acres for every male of upwards of fourteen years of age. The total area of land sown last year with wheat was 410,608 acres, against 390,608 acres last season. The aggregate produce of the harvest amounted to 3,587,800 bushels, or 665,149 bushels below that of 1864–5, the yield per acre being less than in any preceding season, being only eight bushels 44lbs. per acre. During the previous seven years the average yield was twelve bushels. The extent of land upon which hay was cut was 101,966 acres, an increase of more than 50 per cent., but as the crop only yielded 17 cwt. to the acre, or nearly one-fourth less than in 1864–5, the gross produce only resulted in an additional yield of 12,075 tons, being 88,731 tons in place of 76,656 tons. In 1863–4 the average yield was 27 cwt. per acre; it will thus be seen that a serious deficiency has existed in the produce of fodder during the two past seasons, chiefly owing to the drought. 9,362 acres of barley were reaped, against 12,585 acres during the previous season, whilst the gross produce was only 130,760 bushels as compared with 207,022 bushels, the average yield per acre being 13 bushels 48lbs. against 16 bushels 16lbs. the previous year. A decrease of 2,221 acres in the quantity of land under oats appears, 2,872 acres having been sown, and the yield amounted to only 42,642 bushels, a deficiency of 32,493 bushels, the average being but 14 bushels 34lbs. to the acre. There was considerable increase in the quantity of lucern and artificial grasses cultivated, say 7,567 acres, against 2,639 acres last year. Peas appeared in the return for the first time as covering 969 acres. The potato crop proved a failure, only 4,823 tons—being the produce of 2,775 acres planted—or but 35 cwt. per acre. Orchards and gardens cover 6,473 acres. Vineyards now extend over 6,629 acres. The number of vines planted is 7,361,863, of which 5,255,899 are in bearing. There is an increase of 11,094 horses; say, in 1865, 73,993; in 1864, 62,899. Goats have increased from 9,474 to 12,283; and pigs from 53,430 to 55,742; and poultry from 327,881 to 377,001. There are now depastured 158,057 head of cattle, and nine years ago there were 310,460; this decrease is owing to the droughts. During the past year (1864) this number was reduced from 204,892 to 158,057. The total number of sheep returned is 3,779,308, as against 4,106,230, or a decrease of 326,922 sheep, nearly 9 per cent. Instead of exporting large numbers of sheep, as in several previous years, this colony, in 1865, purchased in the neighbouring colonies, and the markets have been regularly supplied with fat cattle from the Darling. In 1864 it exported 186,526 sheep more than it imported, but in 1865 the balance was 38,392 against the colony, and, deducting the first quarter of the present year (1866) 32,837 more. With respect to cattle, the excess of imports in 1864 was 400; in 1865, 6,456 head; and 770 arrived during the past quarter of the present year. These returns nearly all show a decrease in the average yield of crops, and in the quantity of cattle and sheep, which is owing to the severe droughts during the last two seasons.

AUSTRALIAN GOLD AT THE PARIS EXHIBITION.—It is intended to forward to the Paris exhibition a pyramid, representing the space which would be occupied by all the gold produced in Victoria during the last fifteen years. The height of the pyramid will be 50ft. 10in., and at the base it will measure 10ft. square. Its cubic measure will be 1,994ft., and it will represent a weight of 1,071 tons 3qrs. 12lbs., of the value of £140,000,000.

THE INTERCOLONIAL EXHIBITION.—It appears that the Melbourne people are sparing no expense in erecting a suitable building for this Exhibition, which is to be a permanent structure of large dimensions. It is in the form of a nave and aisles, the nave being 50 ft. wide and 50 ft. in height to the roof, and each aisle 16 ft. wide and 15 ft. high. In these aisles it is intended to have courts containing superior samples of different classes of manufactures as distinguished from the general exhibits in the same category. This large hall is supported by 20 columns of brick with stone foundations, the columns reaching 16 ft. in height. Next there is the vestibule; this room is of circular form, its diameter being 78 ft., its height to the apex of the roof 55 ft. On the other side of this vestibule, between it and the annexes, is a space of ground, to be planted with flowers and shrubs, and in which a fountain is to be kept playing. The northern annexe or wing is 171 ft. long and 25 ft. wide, with a square room of 25 ft. at each extremity for refreshment rooms. This wing will be devoted to an exhibition of the processes of the manufacture of various articles, and in it several branches of industry will be be carried on. These are to include quartz crushing, gold beating, silversmiths' work, cigar making, gas making, bookbinding, printing in colours, lithography, &c. The south wing will be similar to the north, and will be set apart for pictures, statuary, and works of art. The area available for exhibition will be about 38,000 ft., or double the space provided in the old building. These particulars show that the Victorian colonists are in earnest, and that they deserve the support of the other colonies. This is, in fact, not a Melbourne but an Australian movement, and Sydney and Adelaide will both have exhibitions in turn if they will but heartily co-operate now.

Obituary.

WILLIAM FISHER HOBBS.—This distinguished agriculturist died on the 11th of October, at his residence, Boxted Lodge, near Colchester, in his fifty-seventh year. Until within the last few years, when declining health compelled him to relinquish an active and laborious life, Mr. Fisher Hobbs was one of the most prominent agriculturists in England. He was a highly successful breeder of stock; farmed largely and well; and combined scientific knowledge with practical experience. He was one of the founders of the Royal Agricultural Society of England; for many years he had been one of the Society's Council, and there were few of its more important committees which were not indebted to his labour and keen powers of investigation. His promptitude and energy were on several occasions of great service to the Society, and through it to English agriculture generally. In the smaller sphere of his own county Mr. Hobbs was equally active and useful. Every county agricultural society formed during the last thirty years was more or less indebted to his assistance in its formation and management; and of the less pretentious labourers' friend societies he was the founder of those at Coggeshall and Earls Colne, and the promoter of several others. The anti-malt-tax also loses one of its most earnest and persevering advocates. He was never married. He had apparently a strong constitution, but the rupture of a blood-vessel brought on increasing debility, followed by partial failure of mind. He was elected a member of the Society of Arts in 1858.

Notes.

GEOLOGISTS' ASSOCIATION.—A *conversazione* will be held in the libraries of King's College, Strand, on Tuesday, November 6, at eight o'clock, when short lectures and demonstrations will be given. "Geology and Mineralogy," by Professor Tennant, F.G.S.; "Petroleum and Paraffin in connection with the Preservation of Animal Food," by Mr. T. Boverton Redwood, F.C.S.; the Graphotype Process of Engraving, by the Graphotype Company; Micro-photography, exhibited by the aid of the Oxy-hydrogen Light, by Mr. Highley, F.G.S., &c.; the Exhibition of Microscopes and Microscopic Geology, Fossils, and other interesting objects. Members of any of the literary scientific societies in London can obtain admission-tickets for themselves and friends from Mr. John Cumming, Hon. Sec., 9, John-street, Adelphi.

THE CATTLE PLAGUE.—It appears, by the return for the week ending Saturday, 20th October, that there is a continued decline in the prevalence of the plague. The number of attacks officially reported for the week is six; this is a decrease of five on the return of the previous week. Fresh outbreaks took place in three farms, or places where cattle are kept; the number that appeared in the last return was also three. There were four healthy cattle slaughtered during the week in consequence of having been in contact with diseased animals. The cases reported are for the following three petty sessional divisions of England, viz.—(Essex) Rochford, one attack: (Shropshire) Whitchurch, one: (Cheshire) Northwich, four. Since the first outbreak of cattle plague 1 in every 19 of the ordinary stock of cattle in Great Britain has been attacked, and out of every 1,000 attacks, the results of which have been reported, 862 animals perished. No cases of plague in sheep have been returned during the week; the total number reported as having been attacked up to the date of this return is 6,826.

TURTLE.—The value of the turtle shipped from the Bahamas is usually about £1,000 per annum, and of tortoise shell £300 to £400. The shipment of live turtle to the States declined during the civil war, and the inhabitants were driven to consume what they caught themselves. The flesh of the turtle is sold in the Nassau market like beef, and at the same price.

Correspondence.

THE ELECTRIC TELEGRAPH.—SIR,—As one of the few remaining members of the Society of Arts, as it was a quarter of a century ago, I was much pleased to read in the last number of our *Journal* the award of Sir I. Brunel and Prof. Daniell in the matter of the invention and introduction of the electric telegraph into this country. I well remember the efforts of Mr. Fothergill Cooke; his conmunications to the Society are recorded in the Transactions—and I have not failed to remark how entirely those in authority, who have recently been distributing honours, appear to have forgotten the two men, Cooke and Wheatstone, to whom the whole credit of the first introduction of the electric telegraph into use is really due; and I cannot but express a hope that the omission will be speedily rectified. My object in addressing you, however, is not to enter into the question of who invented the telegraph, but rather to ask the following question which has often been in my mind, viz., Would it be possible, and if so would it not be desirable, to collect for the use of the nation, during the lifetime of the inventors, a complete series of the telegraphic instruments which have been produced, and which have led to the production of the present simple and beautifully effective instruments? Wheatstone, Cooke, Varley, Siemens, Bain, Brett, Thomson, Bonelli, Hughes, Morse, and numberless other electricians are still living, and doubtless they and the representatives of the Telegraph Company, as also of the late Mr. E. Highton and other deceased inventors, would contribute from their stores, if the instruments so contributed were sure of finding a resting place in one of our national museums. If the idea is worth a moment's

consideration, I shall be obliged by the insertion of this in the *Journal of the Society of Arts*.—I am, &c., AN OLD MEMBER.

NEUMEYER'S GUNPOWDER.—SIR,—I was much surprised to see, by the *Journal* of the 26th October, that Herr Neumeyer does not appear to be aware of the circumstance that his powder was known and used in France many years ago. I have had some by me made from the French formula ten or twelve years ago, and I find it as good now as when fresh made. It is composed of 49 parts of dry chlorate of potash, 28 of yellow prussiate, and 23 of refined loaf sugar, each separately reduced to fine powder in the dry state. The mixing may be performed at any time, either with a box sieve in the small way, or by means of three hoppers, so regulated that they shall empty themselves through one spout in exactly the same time. The properties of this white gunpowder are accurately described, but it is not mentioned that the ingredients, while separate, may be kept in bulk any length of time without the slightest fear of combustion, spontaneous or otherwise. Also that though the white gunpowder does not foul the gun with slimy carbonaceous matter, still it is necessary to oil it from time to time in order to prevent rust, and of course destruction of the surface. I have, however, often fired twenty or thirty rounds, quick time, without any inconvenience, the bullets from a small pistol going clean through a sheet iron target at the usual distance. This powder might be made by mixing the three ingredients in solution and evaporating to dryness, but in that state the result would be useless, because the powder then becomes detonating and explosive, and could not be handled with any degree of safety. It is expulsive power that is required to drive a bullet, and yet not burst the chamber.—I am, &c., HENRY REVELEY.

Oct. 29th.

To Correspondents.

ERRATUM.—In last week's *Journal*, p. 755, col. 2, line 23 from bottom, for "*actual* thoroughfare" read "*arterial* thoroughfare."

MEETINGS FOR THE ENSUING WEEK.

MON ...Entomological, 7.
Farmers' Club, 5½. Mr. James Howard, "On Things in America."
Society of Engineers, 7. Mr. Thomas Cargill, "On the Railway Bridge at La Place de l'Europe, Paris."
Royal Inst., 2. General Monthly Meeting.
R. Inst. of British Architects, 8.

TUES ...Anthropological, 8.
Ethnological, 8. 1. Professor Huxley, "On the Skull of a Patagonian." 2. Mr. J. Crawfurd, "On the History and Migration of cultivated Fruits, in reference to Ethnology."

WED ...Geological, 8. 1. Prof. Huxley, "On some Remains of Dinosaurian Reptiles from the Stromberg Mountains, South Africa." 2. Mr. J. Beete Jukes, "Additional Observations on the Geological Structure of North Devon and West Somerset." 3. Rev. W. B. Clarke, "On Marine Fossiliferous Beds of Secondary Age in Australia."

Patents.

From Commissioners of Patents' Journal, October 26th.

GRANTS OF PROVISIONAL PROTECTION.

Artificial stone cements—2470—G. E. Van Derburgh.
Cast iron—2607—T. Outram.
Dress, articles of—2577—S. Leather.
Ductile materials, shaping—1926—J. H. Selwyn.
Electrical apparatus—2623—A. H. Brandon.
Fibrous materials, preparing—2603—J. Conlong.
Fibrous substances, combing—2601—M. Mirfield and J. Scott.
Fire-arms, breech-loading—2187—W. E. Newton.
Fire-arms, breech-loading—2544—T. Wilson.
Fires, extinguishing—2553—E. Casper.
Folding fencing—2595—J. Greening.
Funnels—2599—W. E. Gedge.
Furnace fire grates—2605—T. Vicars, sen., T. Vicars, jun., and J. Smith.
Furnaces and cupolas—2627—G. Hadfield.
Furnaces—2625—E. B. Wilson.
Garments, fittings—2517—H. A. Bonneville.
Gas—2400—A. R. Stark.
Heated air engines—2633—H. Messer.
Ladies' garments—2409—J. P. Robinson.
Liquid compasses—2360—A. Cairns.
Metal furniture—2613—G. Pitt.
Oil, lamps for burning—2575—E. Lichtenstadt.
Portfolios—2410—G. and E. Ashworth.
Preserved substances, cases for—2639—E. C. Dawson.
Printing rollers—2615—E. Peyton.
Purses, &c., fastenings for—2579—W. Clark.
Railway trains, preventing injury to persons in—2621—W. Manby.
Rooms, heating—2647—W. Clark.
Sewing machines—2611—C. A. McCurd.
Soda waste, separating sulphur from—2593—G. T. Bousfield.
Stale bread, restoring freshness to—2587—J. H. Johnson.
Steam engines—2591—W. E. Newton.
Substances, mills for grinding, &c.—2643—J. Patterson.
Sugar and syrup, refining and deodorizing—2645—E. Beanes.
Tilt hammers—2583—W. E. Gedge.
Tobacco receptacles—2637—J. M. Bancroft.
Toys—2629—D. Rowe.
Trunks, &c.—2619—M. Myers.
Vapour baths—2631—R. H. Bollans.
Vessels, steering—2521—W. Clark.
Water meters—2581—A. Ripley.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Cartridges—2739—W. R. Lake.
Gas burners, fixing draught apparatuses on—2679—J. Bronner.
Jacquard looms—2693—W. E. Gedge.
Sewing machinery—2718—G. Haseltine.
Sewing machinery—2740—G. Haseltine.
Stage carriages—2678—W. Harvey.
Steam boilers, preventing superheating in—2687—G. Haseltine.
Washing machines—2688—J. Miller.

PATENTS SEALED.

1153. R. Stackhouse.
1156. G. F. Russell and W. H. Carbines.
1158. A. A. L. P. Cochrane.
1160. J. W. Burton.
1162. A. Upward & A. A. Cochrane.
1163. G. E. Noone.
1165. W. E. Gedge.
1166. H. C. Butcher.
1170. T. Kirby.
1171. S. Sequelin.
1174. A. Paraf.
1187. W. Soper.
1190. D. B. White.
1193. J. W. Hoffman.
1197. E. Bray & J. C. Hargreaves.
1200. D. Thomson.
1201. J. B. Robertson.
1202. D. R. Edgeworth.
1204. W. Sunderland and G. Stell.
1209. W. P. Piggott.
1210. W. Begg.
1220. J. H. Johnson.
1238. J. Morris.
1253. J. Botterill.
1306. B. Wright.
1325. J. Fletcher.
1341. J. H. A. Bleckmann.
1373. G. H. Bovill.
1430. J. Livesey.
1441. A. V. Newton.
2073. W. E. Newton.
2144. W. E. Newton.
2215. W. E. Newton.
2231. W. E. Newton.
1213. R. R. Riches and C. J. Watts.
1214. A. Bernard.
1217. J. Baron and E. Tattersall.
1219. C. D. Fox.
1221. W. Deakin & J. B. Johnson.
1224. J. Nisbet.
1225. J. Spencer and D. McCorkindale.
1226. G. Davies.
1227. G. Davies.
1228. J. V. Delestre.
1235. F. Gritton.
1257. S. Bourne.
1263. A. T. Becks.
1408. W. A. Lyttle.
1442. J. J. Marçais.
1738. R. Hornsby.
1754. H. A. Bonneville.
1850. L. J. Crossley and J. Sunderland.

From Commissioners of Patents' Journal, October 30th.

PATENTS SEALED.

1230. J. Lewis.
1232. J. Thomas and A. Prince.
1236. F. F. Benvenuti.
1237. H. Moore, T. Sagar, G. Keighley, & T. Richmond.
1239. D. Cohen.
1244. A. A. Constallat.
1246. W. H. Stanley.
1247. C. H. Ramsten.
1252. D. Urquhart.
1258. J. W. Post and W. McI. Cranston.
1260. E. Field.
1264. H. and J. Douglas.
1266. A. Morel.
1269. T., J. jun., J., & N. Blezard.
1270. W. B. Bartram.
1274. J. G. Hope.
1275. J. H. Johnson.
1276. A. Roders.
1278. W. Young and P. Brash.
1282. G. Davies.
1296. F. Waddington.
1300. W. W. Cross.
1317. J. R. Swann.
1347. T. Thornton.
2170. W. E. Gedge.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

2527. C. Fusnot.
2617. J. Ronald.
2677. J. R. Johnson.
2836. G. T. Bousfield.
2620. J. Parker.
2643. W. E. Gedge.
2657. E. R. Hollands.
2656. R. Smith.
2671. G. E. Donisthorpe.
2674. R. A. Brooman.
2755. C. H. Southall and R. Heap.
2648. J. Marshall.
2655. P. B. O'Neill.
2659. W. and S. Firth and J. Sturgeon.
2672. R. B. Jones.
2743. J. Whitworth.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

2448. J. W. Hackworth.
2461. R. A. Brooman.